
Date:	January 19, 2024	Memo No.:	[#####]
To:	JC Hudgison	Project No.:	[#####]
From:	Tillou, Michael M	Internal Distribution:	File/LB
Subject:	Requested analysis of 2024 IECC		

Summary : PNNL reviewed the proposed energy credits in the pending 2024 IECC Residential provisions, as requested by the ICC, and determined sufficient options are available for all building types to meet the energy credit requirements of Appendix RG without using equipment which exceeds federal minimum efficiency requirements.

Background : The ICC Board of Directors received a letter from the Air-Conditioning, Heating, and Refrigeration Institute (AHRI) expressing concern that specific sections of the IECC and IRC Residential provisions may potentially be preempted under the Energy Policy and Conservation Act (EPCA). Specifically, AHRI asserted it would be impossible for all building types to meet the thresholds in Appendix RG using minimum efficiency equipment. The ICC Board of Directors, in turn, asked the IECC Residential Consensus Committee to address AHRI's assertion regarding Appendix RG. ICC staff, on behalf of the ICC Residential Consensus Committee chair, requested that PNNL review the proposed requirements of the (pending) 2024 IECC Residential provisions, and assist in determining whether Appendix RG can be met without using high efficiency equipment (i.e., equipment which exceeds federally regulated minimum efficiency requirements for covered products).

modeling. It is anticipated that many designers will elect to incorporate high efficiency equipment into their building designs, as these options tend to be highly practical and cost effective. However, designers who elect not to utilize high efficiency equipment still have a variety of options, including the use of renewable energy systems or ground source heat pumps, which would meet the required threshold without the need to use equipment which exceeds federal minimum efficiency levels.

AHRI's letter does not assert that Appendix RG explicitly requires the use of high-efficiency equipment, rather they assert that Appendix RG cannot be met in certain applications unless high-efficiency equipment is selected (i.e., not enough credits are otherwise available), and that those cases are only within climate zones 0 through 3. PNNL's review finds that sufficient credits, in all climate zones, are indeed available under Appendix RG without needing to utilize high-efficiency equipment. At the same time, PNNL also notes that high-efficiency equipment is commonly preferred as one of the most cost-effective means of improving whole-building energy performance. It is anticipated that many designers and builders will voluntarily elect to utilize such credits, although in no way required to under Appendix RG. This was considered during committee deliberations and in establishing the provisions of both the base code and Appendix RG.

In addition, PNNL notes that the credit table referenced by AHRI was from the second public comment legislative draft and not the final credit table approved by the Residential Committee. This resulted in discrepancies in available measures, and some of the associated point values. More importantly, AHRI presents the two solar water heater energy credits (R408.2.3(7)(a) and R408.2.3(7)(b)) as unavailable options, suggesting that solar water heaters are an EPCA-covered product. However, DOE does not currently regulate solar water heaters, making these credits available. In addition, AHRI has based their concern on a specific scenario where ground source heat pumps (R408.2.2(1)) and on-site renewable energy systems (R408.2.7) are not feasible in climate zones 0 through 3. PNNL notes that such systems will generally be viable options and that sufficient credits remain available even under such a constrained scenario.

What other avenues are available for complying with Appendix RG?

AHRI's concern is that all possible building types and configurations must be able to comply with the requirements of the IECC. The I-Codes have long recognized that certain building types and configurations may not be able to meet each individual code requirement, and provides opportunities to comply through a variety of prescriptive and performance based options, as well as through alternative means and methods.

Appendix RG Compliance Paths

It is worth noting that, Appendix RG provides three compliance options which can be selected for a given building. In addition to the Energy Credit pathway projects can also chose a simulated building performance path (based on 2024 IECC Section R405) or an

Energy Rating Index (ERI) compliance path (based on Section R406). All three pathways allow buildings to comply using a combination of energy efficiency measures and renewable energy systems. None of the compliance path explicitly requires the use of high efficiency equipment.

Alternative Means and Methods

Another option available to projects is the revised Section R104 which would allow projects to propose alternative materials, design and methods of construction and equipment to meet the requirements of the IECC. The purpose of this section is to underscore that the provisions of the IECC, consistent with the broader collection of I-Codes, are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by the code.

How can the ICC help ensure adopting state and local governments are aware of potential preemption issues and challenges?

The ICC Board's letter to the residential committee chair also requests guidance on how the Board might alert jurisdictions considering adopting the provisions of Appendix RE (All-Electric Residential Buildings) about the risk that an all-electric building solution could face a preemption challenge. If ICC decides it necessary and appropriate to provide such an alert, ICC could provide an advisory note indicating that challenges to similar solutions have been made, and advising that interested jurisdictions review recent legal decisions as part of their adoption proceedings.

As stated above, PNNL's analysis of Appendix RG indicates that the provisions can be met without being required to select high-efficiency equipment. However, if such a challenge was made, a similar note as suggest above could apply.

Review of Individual Concerns Expressed by AHRI:

PNNL has thoroughly reviewed AHRI's concerns and offers the below guidance to clarify the specific concern being raised and the proposed remedy.

AHRI Assertion	PNNL Analysis
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Final Energy Credit Table approved by RE

R408.2.3(5)(a)	Electric Water Heaters (option 3) Split System HPWH: UEF = 2.20 (compressor outdoors)	7	8	8	6	7	5	4	3	3
R408.2.3(5)(b)	Electric Water Heaters (option 4) Split System HPWH: UEF = 3.75 (compressor outdoors)	8	9	10	7	8	5	5	4	3
R408.2.3(6)	Electric Water Heaters (option 5) Rated input capacity > 12 kW: COP = 3.0	10	9	9	7	6	4	3	3	2
R408.2.3(7)(a)	Solar Water Heaters (option 1) All Volumes and DPs, Electric Backup: SUEF = 3.00	13	13	13	9	8	5	4	4	3
R408.2.3(7)(b)	Solar Water Heaters (option 2) All Volumes and DPs, Gas Backup: SUEF = 1.80	10	9	9	6	7	6	5	4	3
R408.2.3(8)	Compact Hot Water Distribution	2	2	2	2	2	2	2	2	2
R408.2.4(1)	More Efficient Distribution System Ductless	3	4	5	7	8	10	10	10	14
R408.2.4(2)	100% of Ducts in Conditioned Space	2								